REMARKS

Claims 1-6 are pending. Claims 1, 2 and 5 have been amended. Claim 6 has been added. No new matter has been presented.

Claims 1-5 were rejected under 35 USC 103(a) as being unpatentable over Inaba, U.S. Patent 6,255,742 in view of Masayasu, UP 08-095504 and Hainz, U.S. Patent 5,138,428. This rejection is respectfully traversed.

Inaba relates to a mounting method of a silicon LSI. The Examiner asserts that Inaba teaches a semiconductor laser device having a laser chip mounted on a base portion using an electrically conductive die-bond paste (citing col. 8, lines 62-67). Referring to col. 8, lines 62-67, Inaba states that "legs 15 of heat dispersion plate 7 are formed by bending tabs provided on a thin plate 0.1 – 0.2 mm thick that is circular or square in shape and composed of copper alloy or 42 alloy (Cu-42%Zn)." Respectfully, this disclosure does not teach a laser chip mounted on a base portion using an electrically conductive die-bond paste including a metal filler. Inaba does disclose a thermoplastic resin and a thermo setting resin (col. 7, line 40 and col. 8, line 54), but fails to disclose that either of these resins include a metal filler, as claimed. Furthermore, as shown in Fig. 7, Inaba discloses that the semiconductor 1 is mounted on island 2 and the thermoplastic resin lies between island 2 and heat dispersion plate 7. Therefore, it cannot be said that the semiconductor element 1 is mounted using the thermoplastic resin at all. In fact, Inaba clearly states that the method of mounting the semiconductor element 1 to the island 2 is the same as in the prior art discussed in the application. Thus, even if you modified Inaba with the teachings of Masayasu, Inaba is not discussing mounting the semiconductor 1 onto a base portion at col. 8, line 62-67, as asserted by the Examiner, so a combination would only teach using the electrically conductive adhesive made of silver paste to mount the island onto the heat dispersion plate. This is not being claimed.

The Examiner acknowledges that claim 1 recites two steps, the first one being a temporary curing of the conductive die-bond paste by keeping semiconductor laser chip pressurized, and after the temporary curing, finally curing the conductive die-bond paste. The Examiner asserts

that it is within one of ordinary skill in the art to know, after attaching a semiconductor element to a base, the bond can be cured by two methods a) leave it alone until the cure bond is done, and b) taking the welded or soldered material into a curing room and curing it at a desired temperature. However, Applicants respectfully note that Inaba never discusses the steps of mounting the semiconductor onto the base portion, but rather mentions that this is done as in the prior art. The rest of the application is not related to this process. The Examiner appears to be using impermissible hindsight to reconstruct the claims. In addition, merely because the Examiner can envision a two-step process, does not mean that the exact same steps of the claimed two-step process are disclosed in any cited reference. In fact, none of the references cited teach the claimed two-step process. Furthermore, even if one of the steps is disclosed in one of the references, there would not have been any motivation to modify the curing process in that reference to employ a two-step process, never mind the specific two-step process being claimed.

Furthermore, it is not a two step curing method to attach an element and then leave it alone. Leaving something alone is not an active step. Also, just attaching the element, as the first step, does not correspond to the claimed first step. Therefore, the Examiner's example is irrelevant. As stated above, Inaba fails to teach or suggest any specific method of mounting the semiconductor onto a base portion, but merely refers to this in a general sense in the background. Even Hainz teaches the final curing step of claim 1, it fails to teach or suggest the first step and there is no suggestion in any reference to modify Hainz to employ the first step. Likewise, there is no teaching of the first step in Inaba, so combining Inaba and Hainz would still fail to teach both claimed steps.

The Examiner also states that it has been held that omission of a function in a combination where the remaining elements perform the same function before involves only routine skill in the art. Respectfully, this case holding does not apply in this instance. The specification discloses the benefits of the claimed two-step process and benefits realized as a result thereof. The simple fact is that the cited references do not really perform the same function because they are not capable of realizing the benefits disclosed in the specification. As discussed in the specification, since the laser chip is kept pressurized in the first curing step, the thickness of the conductive die-bond paste can be kept at 5 μm or less, a stable bonding state can be achieved (pg. 6, line 23- pg. 7,

line 3). Further, since the conductive die-bond paste has already become high in viscosity due to the temporary curing step, the creep-up height of the die-bond paste at the side face of the semiconductor laser chip from the die-bond surface can be made not more than 40 μm, thus the creep-up of the conductive die-bond paste never becomes higher than the position of the active layer of the semiconductor laser chip, and the semiconductor laser chip can be prevented from short circuiting (pg. 7, lines 7-18). Thus, it is not merely a matter of omitting a step where the function is still performed, because omission of the claimed step will result in an inferior product.

Finally, the Examiner asserts that when mounting, welding, or soldering a semiconductor chip on a surface mount, the chip has to be held into position and the means to hold the chip in place inherently includes pressure. Claim 1 has been amended to recite a specific device for pressurizing, which is not disclosed or suggested in any of the cited references. Furthermore, it is not necessary to apply pressure when mounting a chip onto a surface, rather the chip could just be placed there without applying pressure at all.

Accordingly, in light of the discussion above, the features of claim 1 are not taught or suggested by the cited art, either alone or in combination.

With respect to claim 2, the Examiner asserts that Inaba teaches that the thermal resistance of the device is 30° C/W. However, the thermal resistance in this application is calculated by the formula on pg. 17, line 10, and is not the same as an operating temperature of the semiconductor laser device. Since the thermal resistance takes into account various variables, the thermal resistance disclosed in Inaba cannot be said to correspond to the claimed thermal resistance. Furthermore, the Examiner makes the statement that it is within one skilled in the art to know that semiconductor devices have a thermal resistance way above 100° C, therefore having a semiconductor thermal resistance below 90° C is nothing new. As stated above, claim 2 is not claimed the temperature of the device. Applicant does not understand the point the Examiner is trying to make here, and how this statement is relevant. Further, if the Examiner is relying on his own personal knowledge with respect to what is shown in the art, Applicant requests that the Examiner provide a prior art reference which supports his assertions.

With respect to claim 3, Inaba fails to disclose the claimed creep-up height. The Examiner asserts that it would be obvious that there would be some creep-up and discovering the workable ranges would involve only routine skill in the art. Applicant respectfully disagrees.

The MPEP at section 2144.05(II)(B) clearly states that a particular parameter must first be recognized as a result effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. Since Inaba does not even discuss creep-up at all, it would be impossible for it to disclose a particular parameter which would be recognized as a result effective variable in this case. As stated above, it is the temporary curing step which allows the overall creep-up height to remain at not more than 40 μm. Since Inaba fails to teach this step, Inaba would also fail to be able to control the height of the creep-up. Thus, the features of claim 3 are not taught or suggested by the cited art, either alone or in combination.

The remarks above in connection with claim 3 also apply to claim 4. The thickness of the conductive die-bond paste is determined in accordance with table 1 and is not a phenomenon realized by ordinary people skilled in the art. It would therefore not have been obvious to discover this optimum range by one of ordinary skill in the art.

Claims 5 and 6 are allowable at least due to their respective dependencies. Applicant respectfully requests that this rejection be withdrawn.

Applicant respectfully requests that this amendment after final be entered since the amendments made to the claims do not require any further search and/or substantive consideration on the behalf of the Examiner.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no. 20455-2021700.

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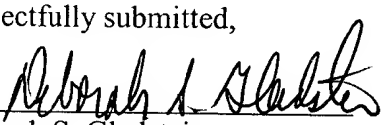
Respectfully submitted,

By 

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